

A4
triisocyanatocyclohexane, 2,4,6-triisocyanatotoluene, ω-isocyanatoethyl-2,6-diisocyanatocaproate, 4,4'-diphenyldimethylmethane-2,2',5,5'-tetraisocyanate, and mixtures thereof.

REMARKS

Upon entry of the present amendment, claims 1, 6 and 23 have been amended, claims 5, 10-22 and 27 have been canceled, claims 28-40 have been added, and claims 1-4, 6-9, 23-26 and claims 28-40 are pending. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with Markings to Show Changes Made".

Rejections under 35 USC 112

Rejections of claims 5, 10 and 27 have been obviated as these claims have been canceled and rewritten as claims 38, 39 and 40, respectively. Support for this amendment is at page 36, line 32 through page 37, line 3 of the specification.

"Substantially free of emulsifier" has a basis at page 11, line 36 to page 12, line 2 of the specification.

The Invention

The present invention as claimed provides stable aqueous dispersions that are substantially free of emulsifiers (emulsifiers may adversely affect coating properties) and have low acid value polymers (low acid values will not adversely affect coating properties as compared to high acid values). Hence, the composition of the invention uniquely provides:

- acid values of the polymer of as low as 4 to about 70;
- an aqueous dispersion (as opposed to a solution) with low VOCs because the dispersion has less than about 2 weight percent organic solvent; and

a stable aqueous dispersion substantially free of emulsifiers with polymers having a small particle size (less than 300 nm) for stability and coating properties.

The Art And The Rejection

None of the cited references describe or suggest a polymeric vehicle (claim 1) or formulated coating (claims 6 and 23) that include specific cross-linking agents and a dispersion that is substantially free of emulsifier as now claimed. Further, none of the cited references alone or in combination describe or suggest a polymeric vehicle that includes polymers with $-SO_3H$ ionizable groups (claim 28) or polymeric vehicles that include polymers that are at least 50 weight percent soluble in isopropanol or methyl ethyl ketone (claim 33).

Rejection of claims 1, 4-6, 9, 10, 23 and 26-27 over U.S. Patent No. 6,048,926.

The '926 reference does not describe a composition that includes a dispersion where the dispersion is substantially free of emulsifiers and which includes a dimerized or trimerized polyisocyanate, triisocyanates, or tetraisocyanates cross-linking agent as now claimed in independent claims 1, 6 and 23. The '926 reference describes a dispersion that includes an aqueous dispersion of organic polyhydroxy compound and unblocked monomeric diisocyanate (see column 3, lines 16-20). The use of cross-linking agents as now claimed to provide a polymeric vehicle or formulated coating is not described or suggested.

Rejection of claims 1-10 and 23-27 over U.S. Patent No. 5,449,707.

The use of cross-linking agents as now claimed to provide a polymeric vehicle or formulated coating is not described or suggested by the '707 patent. The '707 describes aqueous

dispersions of a polyester. The polyester (A-a) is a grafted polyester which has been graft copolymerized with a radical monomer which provides the hydrophilic group. The polyester has double bonds onto which an acrylic monomer/polymer is grafted via an addition or free radical reaction. The polyester has a weight average molecular weight of 5,000-50,000, column 9, line 32. The acrylic chain (A-b) has a weight average molecular weight of 500-50,000, column 9, line 46.

Rejection of claims 1-10 and 23-27 over U.S. Patent No. 6,107,392 or U.S. Patent No. 5,494,980 in view of U.S. '707 or '926.

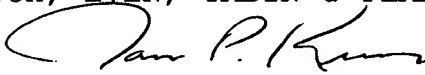
Neither the '392 or '980 references describes or suggests the use of cross-linking agents in an emulsifier free dispersion as now claimed to provide a polymeric vehicle or formulated coating.

The '392 patent describes waterborne curable compositions that include a blend of dispersed graft copolymer. The '392 patent describes the use of alkylated melamine formaldehyde crosslinking agents (see column 9, lines 15-27). As indicated above, the '707 and '926 patents do not describe the use of cross-linking agents as claimed. Hence, the cited references alone or in combination do not describe or suggest the invention as now claimed.

The '980 patent describes water dispersible hybrid polymers but does not describe or suggest the use of cross-linking agents in an emulsifier free dispersion as now claimed.

Conclusion

In view of the foregoing, applicants respectfully request reconsideration and allowance of the pending claims as amended.

Respectfully submitted,
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Claims Showing Changes Made

1. (Once amended) A polymeric vehicle comprising an aqueous dispersion of a neutralized polymer in water, a co-solvent, and a [an isocyanate] cross-linking agent [comprising an isocyanate compound],

which dispersion is substantially free of emulsifiers,
wherein the cross-linking agent is selected from the group
consisting of dimerized or trimerized polyisocyanate,
triisocyanates, tetraisocyanates and mixtures thereof,

wherein the polymeric vehicle is effective for providing a coating binder film, wherein the polymer is selected from the group consisting of condensation polymers, addition polymer and hybrid polymers of condensation and addition polymers, wherein the polymer has an acid value of from about 4 to about 70 prior to neutralization, and a solubility of at least about 50 weight percent in a hydrophilic organic solvent which solvent has a solubility of at least 5 weight percent in water, and wherein the aqueous dispersion has less than about 2 weight percent organic solvent, at least about 30 weight percent solids, a viscosity of less than about 20 poise at a temperature of about 25°C., and a mean particle size of not more than about 300 nm.

6. (Once amended) A formulated coating composition comprising an aqueous dispersion of a neutralized polymer in water, a co-solvent, and a [an isocyanate] cross-linking agent [comprising an isocyanate compound],

which dispersion is substantially free of emulsifiers,
wherein the cross-linking agent is selected from the group
consisting of dimerized or trimerized polyisocyanate,
triisocyanates, tetraisocyanates and mixtures thereof,

the formulated coating composition being effective for providing a coating binder film, wherein the polymer is selected from the group consisting of condensation polymers, addition polymer and hybrid polymers of condensation and

addition polymers, wherein the polymer has an acid value of from about 4 to about 70 prior to neutralization, and a solubility of at least about 50 weight percent in a hydrophilic organic solvent which solvent has a solubility of at least 5 weight percent in water, and wherein the aqueous dispersion has less than about 2 weight percent organic solvent, at least about 30 weight percent solids, a viscosity of less than about 20 poise at a temperature of about 25°C., and a mean particle size of not more than about 300 nm.

23. (Once amended) A formulated coating composition comprising a first component and a second component, the first component comprising an aqueous dispersion of a neutralized polymer in water and a co-solvent, the second component comprising a [an isocyanate] cross-linking agent [which comprises an isocyanate compound],

which dispersion is substantially free of emulsifiers,
wherein the cross-linking agent is selected from the group
consisting of dimerized or trimerized polyisocyanate,
triisocyanates, tetraisocyanates and mixtures thereof,

the first and second component when mixed being effective for providing a coating binder film, wherein the polymer is selected from the group consisting of condensation polymers, addition polymer and hybrid polymers of condensation and addition polymers, wherein the polymer has an acid value of from about 4 to about 70 prior to neutralization, and a solubility of at least about 50 weight percent in a hydrophilic organic solvent which solvent has a solubility of at least 5 weight percent in water, and wherein the aqueous dispersion has less than about 2 weight percent organic solvent, at least about 30 weight percent solids, a viscosity of less than about 20 poise at a temperature of about 25°C., and a mean particle size of not more than about 300 nm.